***CLASS SET- PLEASE DO NOT REMOVE!***

**Exothermic versus Endothermic Reactions**

MAIN IDEA: Exergonic reactions release energy and endergonic reactions absorb energy.

After reading the passage below, answer the following Essential Questions in your notebook:

1. What is the source of energy changes in chemical reactions?
2. When will energy be required? When will energy be released?

DRAW A VENN DIAGRAM FOR #3 & 4

1. How are exergonic and endergonic reactions similar? How are they different?
2. How are exothermic and endothermic reactions similar? How are they different?
3. Give at least one example each of and endothermic and exothermic reaction.
4. Is energy conserved during a chemical reaction?
5. In an exothermic reaction, would the excess energy be written on the reactant side, or the product side? What about in an endothermic reaction?

All chemical reactions release or absorb energy in the form of light, sound, heat, or electricity. The source of this energy is found the chemical bonds present. To start any reaction a minimum about of energy, or activation energy, is needed. Once begun, chemical reactions will result in the breaking and/or formation of bonds. Breaking bonds requires energy, while forming bonds releases energy.

When the activation energy needed to break a bond is less than the energy released to form a new bond, an exergonic reaction occurs. The excess energy can be experienced as light, heat, and sound. If heat (thermal energy) is created, the reaction is known as exothermic. An example includes the burning of fossil fuels for energy in our homes. While useful, the impurities burned produce pollutants that combine with water vapor in the air to create acid rain.

Obviously the opposite can also occur. If more energy is absorbed than released, an endergonic reaction happens. The energy absorbed can take many forms, including light, thermal energy (heat) and electricity. For example, electricity can be used to decompose stable water into hydrogen and oxygen gas. The reaction would not occur without this additional energy.

An endothermic reaction is an endergonic reaction that requires heat to occur. Your book gives two great examples. Epsom salt requires energy to dissolve in water, therefore the water will get colder. The book describes this as a physical change, but the ionic bond between Na+ and Cl- is still being broken. Decomposition of baking soda while baking cookies is another example. Here the product of CO2 creates gas pockets in the dough causing it to puff up.

Just as with mass, there is a Law of Conservation of Energy that says the total amount of energy will never change. Therefore:

Exergonic: Total chemical energy = Total chemical energy + Energy released

 of reactants of products

Endergonic: Energy absorbed + Total chemical energy = Total chemical energy

 of reactants of products

Glue the following into your notebook (left side). Answer on the right side.

11/13 Essential Questions:

1. What is the source of energy changes in chemical reactions?
2. When will energy be required? When will energy be released?

Venn Diagram

DRAW A VENN DIAGRAM FOR #3 & 4

1. How are exergonic and endergonic reactions similar?

How are they different?

1. How are exothermic and endothermic reactions similar?

How are they different?

1. Give at least one example each of and endothermic and exothermic reaction.
2. Is energy conserved during a chemical reaction?
3. In an exothermic reaction, would the excess energy be written on the reactant side, or the product side? What about in an endothermic reaction?
4. Which reaction below could be endothermic? Which could be exothermic? Explain why.



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